

SECTION 33 83 02

RADIO NETWORK / MONOPOLE ANTENNA TOWER

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Design of monopole and foundation site grounding and lightning protection.
- B. Fabrication of structural steel.
- C. Construction of foundation.
- D. Erection of the monopole.
- E. Installation of site grounding and lightning protection and all tower appurtenances.

1.02 RELATED SECTIONS

The designing, furnishing, installing, and testing the new antennas, amplifier, and radio frequency cable and other accessories as required on the monopole is specified in Section 33 83 03, Trunked Radio Network / Antenna System.

1.03 MEASUREMENT AND PAYMENT

All work required under this Section will be measured separately for payment as part of the Contract lump-sum price, as part of the related item of work, as indicated on the Bid Schedule of the Bid Form.

1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A 36 Specification for Structural Steel
 - 2. ASTM A 53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
 - 3. ASTM A 123 Specification for Zinc (Hot-Dipped Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strips
 - 4. ASTM A 325 Standard Specification for High-Strength Bolts for Structural Steel Joints
 - 5. ASTM A 394 Specification for Zinc Coated Transmission Tower Bolts
 - 6. ASTM A 563 Specification for Carbon and Alloy Steel Nuts

- 7. ASTM A 572 Specification for High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality
- 8. ASTM B-695 Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
- 9. ASTM C 33 Specification for Concrete Aggregates
- 10. ASTM C 94 Specification for Ready-Mix Concrete
- 11. ASTM C 150 Specification for Portland Cement
- B. American Concrete Institute (ACI):
 - ACI 318 Building Code Requirements for Reinforced Concrete
- C. American Institute of Steel Construction (AISC):
 - AISC 9th Ed Manual of Steel Construction, Allowable Stress Design
- D. American National Standards Institute (ANSI):
 - ANSI/EIA/TIA-222 Structural Standards for Steel Antenna Towers and Antenna Supporting Structures
- E. American Welding Society (AWS):
 - AWS D1.1 Structural Welding Code, Steel
- F. California Building Code (CBC), 2001 Edition
- G. M/A-Com Incorporated:
 - Document AE/LZT 123 4618/1, Site Grounding and Lightning Protection
- H. National Electric Code (NEC):
 - NEC Article 318 Cable Tray
- I. National Electrical Manufacturers Association (NEMA):
 - NEMA VE 1 Metallic Cable Tray Systems

1.05 SUBMITTALS

- A. General: Refer to Section 01 33 00, Submittal Procedures, and Section 01 33 23, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.
- B. Product Data: Submit manufacturer's specifications for materials. Work shall not proceed until the manufacturer's specifications have been approved by the Engineer and returned to Contractor.

- C. Drawings and Calculations: Submit, within 20 calendar days of the effective date of the Notice to Proceed, the following items for approval. Drawings and calculations submitted that come under the jurisdiction of the California Professional Engineers Act shall conform to the Act and bear the seal and signature of a California Civil or Structural Engineer:
1. Monopole structural detail drawings showing plate sizes, required welds and detail of splices.
 2. Foundation design drawings showing details of anchor bolts, reinforcing bars and other embedded items.
 3. Plot plan showing monopole foundation location.
 4. Erection plan.
 5. Calculations for monopole and its foundation.
 6. Site grounding and lightning protection design and details.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Steel:
1. Structural steel shall conform to ASTM A 36 for medium steel and ASTM A 572, Grade 65 for high-strength steel.
 2. Structural steel pipes and antenna mounts shall conform to ASTM A 53, Grade B.
 3. Assembly bolts shall conform to ASTM A 325 or ASTM A 394 (Type 1 or 2). Nuts shall conform to ASTM A 563 and be of grade and style suitable for use with bolts supplied. Nuts for A 325 bolts shall be heavy hex nuts.
 4. Monopole and supports shall be hot-dipped galvanized per ASTM A 123. Monopole and other tubular members shall be galvanized both inside and outside. Fasteners shall be mechanically galvanized per ASTM B 695.
 5. Welding rods shall conform to AWS D1.1.
- B. Reinforced Concrete:
1. Concrete shall be Class 3000 with maximum aggregate size of 1½ inches per Section 03 05 15, Portland Cement Concrete. Slump shall be as low as practicable to produce a dense, well-consolidated concrete and not exceed 4 inches unless otherwise authorized by the Engineer.

2. Reinforcing bars shall be deformed billet steel, Grade 60, conforming to ASTM A 615, except that the maximum yield strength shall be 78,000 psi, and the tensile strength shall not be less than 1.25 times the actual yield strength.
- C. Site Grounding and Lightning Protection: As required by M/A Com Document AE/LZT 123 4618/1.

PART 3 – EXECUTION

3.01 DESIGN

- A. Monopole Requirements. The design of the pole, platform and antenna support shall meet EIA Standard 222 or the California Building Code. All steel members, lightning rod, platform, climbing facilities, among others shall be galvanized.
1. Monopole shall be galvanized structural steel 150-foot (or as otherwise specified) high self-supporting pole with multiple sided cross section in plan.
 2. A manufactured triangular platform shall be provided at the top of the monopole. Height shall be manufacturer standard. Platform shall be equipped with structural members to support and mount the following equipment:

Qty	Item	Purpose	Azimuth	Ht(ft)/wt(lb)
1	Antenna	Receive	Omni	16 / 66
1	Amplifier	Tower Top	---	3 / 25
1	Antenna	Test	Omni	15.3 / 66
2	Antenna	Transmit	Directional	13.4 / 50 each

3. Monopole shall be equipped with manufacturer standard lightning rod at the top and shall be attached so as to extend a minimum of 18" above the highest point of the monopole including all attachments.
4. Monopole shall be equipped with protective grounding and climbing facilities that conform to EIA Standard 222.
5. Monopole shall be equipped with support for cable ladder tray.
6. Cable ladder tray shall be provided between monopole and existing station building.
7. Wind Loading: In accordance with the provisions of CBC, design for basic wind speed of 80 mph, $I_w=1.15$ and Exposure D.
8. Seismic Loading: Use Importance Factor equals 1.25.
9. Radial ice is 0 inch.

10. Maximum monopole twist and sway due to design wind loading shall be less than two (2) degrees.
11. The tower and foundation shall be installed with site grounding and lightning protection that conforms to Industry Standard "Site Grounding and Lightning Protection" from M/A-Com, Document AE/LZT 123 4618/1.

B. Foundation Requirements:

1. Contractor shall obtain a geotechnical report on the site. A copy of the report shall be provided to the District. There is no guarantee expressed or implied that the conditions indicated in the report are representative of those existing throughout the work site or that unforeseen developments may not occur. If at the time of excavation, the Contractor finds soil conditions that are significantly different than stated in the report, the Engineer needs to be notified immediately.

3.02 INSTALLATION

- A. The Contractor shall notify the Engineer at least one week before the start of field work. Locations of underground utilities are shown on the Drawings. Contractor must receive approval from the Engineer prior to excavation of foundation.
- B. Forms shall be constructed true to the lines and dimensions shown on the Contract Drawings.
- C. Reinforcing bars shall be accurately placed and securely held in place during placing of concrete. All ties shall be drawn up tight.
- D. Top of footing shall be given a steel trowel finish.
- E. Monopole shall not be erected on concrete that has been in place less than 48 hours and only if in the Engineer's opinion that the concrete has acquired sufficient strength to support the steel.
- F. Installation of portions of monopole shall be accurately plumbed, aligned, leveled and shall be braced as required for safety, for accuracy of placement and carry loads to which they may be subjected. Maximum deviation from a straight line between any two points shall not exceed 1 part in 1000.

END OF SECTION 33 83 02